

Emissions of Greenhouse Gases in the United States 2004

Report #: DOE/EIA-0573(2004)

Released Date: December 2005

Next Release Date: December 2006

Table 26. U.S. Nitrous Oxide Emissions from Nitrogen Fertilization of Agricultural Soils, 1990 and 1996-2004

Source	1990	1996	1997	1998	1999	2000	2001	2002	2003	P2004
Million Metric Tons Carbon Dioxide Equivalent										
Direct Emissions										
Biological Fixation in Crops....	58.6	62.6	66.4	68.7	68.2	67.9	69.5	65.3	62.5	70.9
Nitrogen Fertilizers	53.1	47.1	47.2	47.5	47.7	45.6	44.4	45.6	48.0	50.0
Crop Residues	28.2	31.9	34.2	34.8	33.8	34.6	34.7	32.9	32.8	38.5
Soil Mineralization.....	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.2	3.2
Animal Manure	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Sewage Sludge.....	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6
Total Direct Emissions....	144.1	146.0	152.2	155.5	154.1	152.4	153.0	148.2	147.7	163.9
Indirect Emissions										
Soil Leaching	36.3	32.4	32.4	32.6	32.8	31.3	30.6	31.4	33.0	34.3
Atmospheric Deposition	6.5	5.8	5.8	5.8	5.8	5.6	5.5	5.6	5.9	6.1
Total Indirect Emissions ...	42.8	38.2	38.2	38.5	38.6	36.9	36.0	37.0	38.8	40.4
Total	186.9	184.2	190.5	194.0	192.7	184.9	189.1	185.1	186.6	204.3
Thousand Metric Tons Nitrous Oxide										
Direct Emissions										
Biological Fixation in Crops....	198	212	224	232	230	229	235	221	211	240
Nitrogen Fertilizers	179	159	159	161	161	154	150	154	162	169
Crop Residues	95	108	116	118	114	117	117	111	111	130
Soil Mineralization.....	10	10	10	10	10	11	11	11	11	11
Animal Manure	4	4	4	4	4	4	4	4	4	4
Sewage Sludge.....	1	1	1	1	1	1	1	2	2	2
Total Direct Emissions....	487	493	514	525	521	515	517	501	499	554
Indirect Emissions										
Soil Leaching	123	109	110	110	111	106	103	106	111	116
Atmospheric Deposition	22	20	20	20	20	19	18	19	20	21
Total Indirect Emissions ...	144	129	129	130	130	125	122	125	131	136
Total	631	622	643	655	651	640	639	625	630	690

P = preliminary data.

Notes: Data in this table are revised from the data contained in the previous EIA report, *Emissions of Greenhouse Gases in the United States 2003*, DOE/EIA-0573(2003) (Washington, DC, December 2004). Totals may not equal sum of components due to independent rounding.

Sources: Estimates presented in this chapter. Emissions coefficients from Intergovernmental Panel on Climate Change, *Greenhouse Gas Inventory Reference Manual: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, Vol. 3 (Paris, France, 1997), pp. 4.89-4.107, web site www.ipcc.ch/pub/guide.htm. Total nitrogen content of U.S. commercial fertilizer consumption—1988-1994, Tennessee Valley Authority; 1995-2002, Association of American Plant Food Control Officials, *Commercial Fertilizers* (Washington, DC, various years). Manure application based on cattle population data provided by the U.S. Department of Agriculture, National Agricultural Statistics Service, web sites www.usda.gov/nass/pubs/histdata.htm and www.nass.usda.gov/ipedb/. Typical animal sizes from U.S. Environmental Protection Agency, Office of Air and Radiation, *Anthropogenic Methane Emissions in the United States: Estimates for 1990* (Washington, DC, April 1993), p. 6-8. Manure production and waste management systems used from L.M. Safley, M.E. Casada et al., *Global Methane Emissions From Livestock and Poultry Manure* (Washington, DC, February 1992), and U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2003*, EPA 430-R-05-003 (Washington, DC, April 2005), web site <http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissionsUSEmissionsInventory2005.html>.